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SOME RARE OR LITTLE-KNOWN MEXICAN CORAL SNAKES

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The Mexican coral snakes of the genus *Micrurus* include the widespread species *affinis*, with a number of geographic races; a series of forms in southwestern Mexico, *nuchalis* and *browni*, whose relations are somewhat obscure; *diastema* of the Pacific lowland, with three described subspecies; and the dubious *fitzingeri*, which is probably merely one of the races of *affinis*. *Micrurus nigrocinctus* and *latifasciatus* enter Chiapas from Guatemala, and *fulvius* enters Tamaulipas from Texas. Since the appearance of my accounts of Central American and Mexican coral snakes in 1933 and 1936 no very significant material has been added to museum collections of these snakes.

Four forms of coral snakes in Mexico fall entirely outside the range of variation of the species above named: *bernadi*, with dorsal spots instead of rings; *elegans*, with the most complex of triad patterns; *laticollaris*, with a simple but invariable triad pattern; and *ephippifer* of Tehuantepec, in which bold black dorsal saddles occupy the red annuli. These four are quite unrelated to one another, and, so far as is now discernible, to any of the other Mexican species. In my studies of coral snakes I have intentionally delayed the treatment of the more problematic forms in the hope that additional material might accumulate. Meanwhile I have summarized the knowledge of the forms that present the least taxonomic difficulty. Additional material of these more distinct forms will add to our knowledge of their distributions and extent of variation but will not alter their status as well-defined taxa. It happens that the ranges of the four forms here discussed do not meet anywhere in Mexico (fig. 32).

* Deceased September 26, 1957.

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I am indebted to Mr. Charles M. Bogert, of the American Museum of Natural History, for the loan of important material of *Micrurus ephippifer* and of the most recently collected specimens of the spotted *M. bernadi*. Dr. Doris M. Cochran, of the United States National Museum, has forwarded the series of *Micrurus elegans elegans* extant from the Sartorius collection, and new material of *laticollaris* was received through Dr. Hobart M. Smith and Dr. Edward H. Taylor. I continue to be indebted to Dr. Norman Hartweg, of the Museum of Zoology of the University of Michigan, whose loan of the second known specimen of Bernad's coral snake stimulated the preparation of this paper, the seventh in the series of renewed studies of *Micrurus*, begun in 1952.

Micrurus bernadi Cope

Elaps bernadi Cope in Perez, 1886, Proc. U. S. Nat. Mus., 9: 190 (nomen nudum); Cope, 1887, Bull. U. S. Nat. Mus., 32: 87—Zacualtipan, Hidalgo, Mexico.

Micrurus bernadi Schmidt, 1933, Field Mus. Nat. Hist., Zool. Ser., 20: 40; Smith and Taylor, 1945, Bull. U. S. Nat. Mus., 187: 172; 1950, Univ. Kansas Sci. Bull., 33, pt. 2, p. 333.

Material examined.—Hidalgo: Zacualtipan, Acad. Nat. Sci. Phila. no. 14767, type. Puebla: Necaxa, Mus. Zool. Univ. Mich. no. 85967, Amer. Mus. Nat. Hist. nos. 77431–77432.

Diagnosis.—A coral snake of the genus *Micrurus* with the normal body form and usual arrangement of head shields; ventrals about 208 in males, 225 in females; caudals about 44 in males and 38 in females; no trace of supra-anal keels; color pattern of black dorsal spots on red ground color.

Original description.—This species is founded on a specimen from Zacualtipan, Hidalgo, sent me by Dr. Santiago Bernad. It is allied to the *E. epistema* D. & B., but has better claim to be regarded as a species than that form. The head and nape are black above and below, except a band of yellow from lip to lip crossing the middle of the occipital plates. The body is red, and is marked by forty-one broadly oval black spots placed transversely and separated by narrow interspaces of two and three scales length. The red spots are not light bordered, and the red scales have no markings. The belly is unspotted. The tail is of lighter color than the body, and is marked by seven black rings.

Gastrosteges, 218; anal divided; urosteges, 37. Total length 807 mm.; length of tail 90.

Notes on type.—The type is a female. The black spots (fig. 33, A) are 5 to 7 scales in width and 2 to 3 scales long. The nuchal ring, as implied in the description, is complete below. An anal black spot belongs to the first caudal ring. I count 221 ventrals from the chin-

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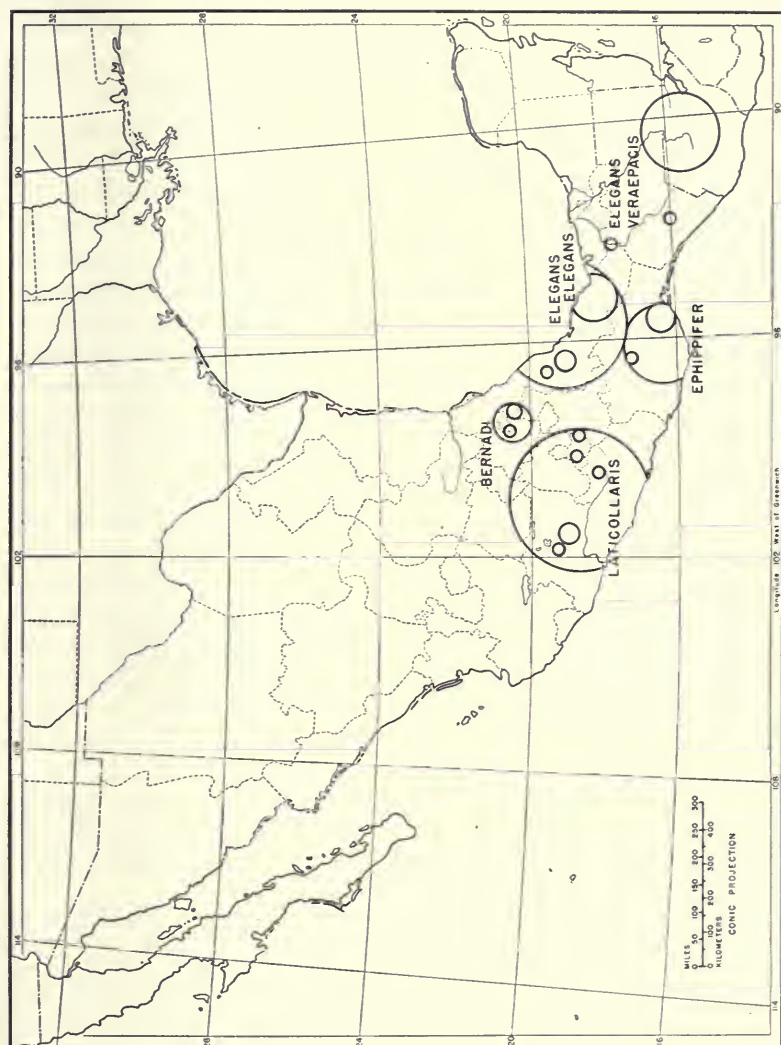


FIG. 32. Map of Mexico, with known ranges of *Micrurus bernadi*, *M. ephippifer*, *M. elegans*, and *M. laticollaris*.

shields, and 39 caudals (all divided). There are 8 (instead of 7) caudal black rings. The total length is now 826 mm., tail 85 mm.

Variation.—The second known specimen of *bernadi*, from Necaxa, Puebla, was received by the Museum of Zoology of the University of Michigan from Myron C. Gordon, who had obtained a small collection of snakes from a United States engineer resident in Necaxa; the collection included also the type of *Tantilla morgani* Hartweg.

This specimen resembles the type of the species in the essential characters of lacking yellow in the pattern, and of having dorsal spots instead of rings and a reduced transverse band across the parietals (fig. 33, B). It is a male, 504 mm. in length, with the tail markedly swollen, 66 mm. in length. There is no trace of supra-anal keels. The ventrals number 214 and the caudals 48, thus presenting the normal sexual difference. The scale rows are 17 anteriorly, reducing to 15 by fusion of rows one and two at the fifth widened ventral. The dorsal spots number 42 on the body with 12 rings on the tail. The nuchal ring is confluent with the black of the sides of the head, and this is followed by a black ring complete beneath and open above. The remaining black spots are somewhat irregular, 10 to 11 scales wide and 2 in length. In addition to the post-nuchal ring two spots are open above.

Two additional specimens of *bernadi* from Necaxa were collected for the American Museum of Natural History, nos. 77431 and 77432. They somewhat extend the range of variation, for the male has 203 and the female 228 ventrals, with caudals 41 and 38, respectively. The male specimen measures 278 mm. (tail 28 mm.), and the female 608 mm. (tail 61 mm.). The numbers of dorsal spots are decidedly fewer, 24 + 5 in the male and 33 + 5 in the female.

The difference between the Necaxa specimens and the Zacualtipan type is mainly in the wider and more band-like dorsal spots, which extend to the second or third scale row.

Distribution.—The two known localities for *bernadi*, separated by a state boundary, are actually fairly close, Necaxa being at about the same latitude as Zacualtipan (see fig. 32). It is extraordinary that the four specimens should fail to show relationship to any of the ringed species in Mexico.

Discussion.—The three specimens from Necaxa differ sufficiently from the type to represent a distinct subspecies, if additional specimens from the type locality in Hidalgo should confirm the distinction of the two populations. With only four specimens available, their differences must be regarded as representing the range of variation

of a single form. The reduction of the black rings to spots recalls the aberrant individual of *Micrurus affinis alienus* with this pattern, and likewise the occasional spotted pattern of *Micrurus d. diastema*. These forms are remote from the range of *bernadi*, and differ in scale characters and head pattern.

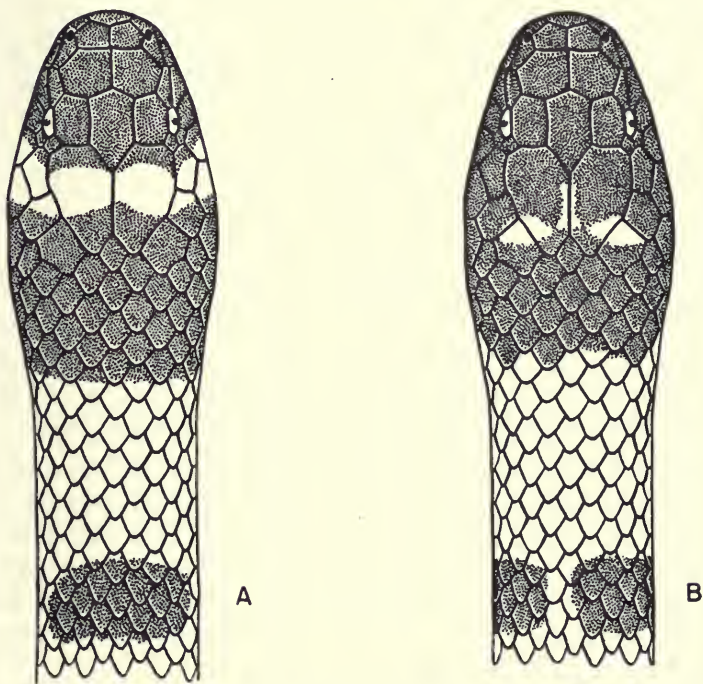


FIG. 33. Diagram of head pattern of *Micrurus bernadi*: (A) type, ANSP no. 14767, and (B) UMMZ no. 85967.

Mr. Bogert calls my attention to the apparent tendency toward a spotted pattern in the harmless colubrid snake *Pliocercus* from Necaxa. Much more material and much observation is required to establish a correspondence of the populations of these venomous and harmless species, and to throw light on the vexing problem of mimicry of coral snakes by harmless species.

***Micrurus ephippifer* Cope**

Elaps ephippifer Cope, 1886, Proc. Amer. Phil. Soc., 23: 281—Pacific side of Isthmus of Tehuantepec.

Micrurus ephippifer Schmidt, 1933, Field Mus. Nat. Hist., Zool. Ser., 20: 38; Smith, 1943, Proc. U. S. Nat. Mus., 93: 453; Woodbury and Woodbury,

1944, Jour. Washington Acad. Sci., **34**: 371; Smith and Taylor, 1945, Bull. U. S. Nat. Mus., **187**: 174; Smith and Langebartel, 1949, Jour. Washington Acad. Sci., **39**: 416; Smith and Taylor, 1950, Univ. Kansas Sci. Bull., **33**, pt. 2, p. 340.

Material examined.—Oaxaca: Tehuantepec, Mus. Hist. Nat. Paris nos. 4614f, 4614j, U. S. Nat. Mus. no. 111328, Amer. Mus. Nat. Hist. no. 68960; Pacific side, Isthmus of Tehuantepec, U. S. Nat. Mus. no. 30085 (type); Cerro Arenal, 30 km. west of Tehuantepec, U. S. Nat. Mus. no. 111329; La Concepcion, 50 km. west of Tehuantepec, U. S. Nat. Mus. no. 111330, Univ. Ill. Nat. Hist. Mus. no. 3791; Huilotepec, U. S. Nat. Mus. no. 46559; Oaxaca, 1 mile northeast of city, E. H. Taylor coll. no. 23522; Mount Guiengola, Amer. Mus. Nat. Hist. nos. 64602, 65889, 65161; Escuranos, Amer. Mus. Nat. Hist. no. 65890; Santa Lucia, Amer. Mus. Nat. Hist. no. 66965; Limon, near Llano Ocotal, below Tenango, Amer. Mus. Nat. Hist. no. 68026.

I have not examined the two specimens described in detail by Smith and Langebartel (1949), one of which is from La Concepcion and the other from Nisabibi, nor the specimen recorded by Woodbury and Woodbury (1944) from the vicinity of Tehuantepec.

Diagnosis.—A coral snake with alternate red, yellow, and black rings, in which the red rings are so heavily invaded by black pigment dorsally that the dorsal view may give the impression of alternately narrow and wide black rings, separated by narrow yellow ones. No supra-anal keels in males. Ventrals in males about 218, caudals about 50; in females 230 and 40. The black saddles in the red zones give the species its name.

Original description.—A species of this genus has been obtained by Francis Sumichrast, on the Pacific side of the Isthmus of Tehuantepec, which I believe to be undescribed. It is referred to in the Proceedings of the American Philosophical Society, 1869, p. 162, as *Elaps aglaeope*; but it is distinct from this species. I propose that it be called *Elaps ephippifer*. It has the seven superior labials and fifteen rows of scales of the most of the American *Elaps*, and the labials are separated from parietals by one row of temporals. The rostral plate is transverse and not particularly prominent, and its posterior border is very openly angulate. The frontal plate has long parallel lateral borders, and much shorter posterior ones. Gastrosteges, 218; anal divided; urosteges, 43. There are seventeen black rings on the body, which encircle the abdomen, covering a length of four and a half scales and five or six gastrosteges. They are separated by nine or ten scales, and have a wide yellow border of one and a half or two scales in width. The entire space between these yellow borders is occupied by a large black spot, which descends on each side to the second row of scales. The remaining space between the yellow borders is red. There is a wide black entire collar, which cuts off the apex of the parietal shields. The muzzle and front are black as far as the anterior part of the parietals.

The wide yellow borders in this species are like those of the *E. euryxanthus*, while the black saddles represent the black spots of the *E. aglaeope*.

Notes on type.—The type, no. 30085 in the United States National Museum, has been examined. My count of the ventrals, 225, differs from that in the original description mainly in my beginning with the first scale behind the chin-shields, and my 44 subcaudals include the single terminal scale. Cope failed to note that the second temporal on the left side is divided. He gives one less black ring on the body, presumably omitting the nuchal.

Variation.—The series of *ephippifer* available for consideration consists of seven males and eleven females. The counts vary as follows:

	Ventrals	Caudals	Black rings on body	Black rings on tail
♂ ♂	212–221	43–56	13–20	5–6
♀ ♀	218–239	31–44	16–26	4–6

The oculars are invariably 1–2 on each side, and the temporals 1–1 except for the count of 1–2 on one side of the head of the type specimen. The upper and lower labials are invariably 7. The dorsal scale rows are 15 throughout. The anal is uniformly divided, as are the caudals except for two male specimens that have one and three undivided caudals, respectively. The longest male specimen measures 722 mm. (tail 106 mm.), with no trace of supra-anal keels. The longest female measures about 925 mm. (tail about 75 mm.). The average proportionate tail length in five males is 0.14, in six females 0.10.

The color pattern presents little more variation than is found in the scaling. The body rings average 18 in males and 21 in females, and the caudal rings average respectively 6 and 5. In certain specimens the black saddle may occupy only the middle third of the red zone (*E. H. Taylor coll. no. 23522, Paris no. 4614j*). Smith and Langebartel comment on their specimen from Nisabibi as having only 13 black rings, the lowest number on record. They did not, however, know of the Guiengola specimen, AMNH 65161, in which the rings number 15, nor did they realize that the number of black rings is usually fewer in males than in females.

Distribution.—*Micrurus ephippifer* is confined to the Mexican state of Oaxaca. Its range may well be allopatric with that of other coral snakes of the Isthmus of Tehuantepec, for no other species is recorded from Mount Guiengola. Mr. T. C. McDougall, to whom specimens of *ephippifer* were brought by natives who were clearing

land for *milpas* on the slopes of Mount Guiengola, supplies the following information: The mountain, which reaches an altitude of nearly 1,000 meters, is xeric at the base and on the lower slopes. Remnants of pine at the top indicate that its upper portions were formerly forested. The local phrase to distinguish the venomous from the non-venomous "coral" is: "Black and yellow kills the fellow, red-and-black poison lack." One would like the words of the Spanish version.

Further data on the habitat of this species are required.

***Micrurus elegans elegans* Jan**

Elaps elegans Jan, 1858, Rev. Mag. Zool., (2), 10: 524—Mexico; 1859, Prodr. Icon. Descr. Ophidiens, p. 13, pl. B; 1872, Icon. Gen. Ophidiens, Livr. 42, pl. 5, fig. 2; Boulenger, Cat. Snakes Brit. Mus., 3: 418.

Micrurus elegans Amaral, 1929, Mem. Inst. Butantan, 4: 229.

Micrurus elegans elegans Schmidt, 1933, Field Mus. Nat. Hist., Zool. Ser., 20: 32; Smith and Taylor, 1945, Bull. U. S. Nat. Mus., 187: 172; Univ. Kansas Sci. Bull., 33: 348—type locality restr. to Jalapa, Vera Cruz.

Material examined.—Vera Cruz: Mirador, U. S. Nat. Mus. nos. 6367 (*a*, *b*, and *c*), 25041–25042, 25045; Xico, Chicago Nat. Hist. Mus. no. 1347; Huatuzco, British Museum (Nat. Hist.) nos. *a*–*b*.

In addition, scale counts are available for specimens without data known to exist in the museums of Bonn, Germany, and Turin and Milan, Italy (Jan, 1859).

Diagnosis.—A coral snake of the genus *Micrurus* with the normal body form and arrangement of scales; pattern extremely complex (fig. 34), with black rings in groups of three (triads), the rings subequal above, the outer rings in each triad narrowed below, with corresponding widening of the red ring intervening between triads; the outer black rings of each triad separated from the middle one by narrow yellow rings split by a black one; the triad pattern lost on the tail, where equally wide black rings are separated by double yellow rings. The black head crossed by a narrow yellow ring behind the eyes and behind the parietals, the two black portions of the head with the nuchal ring composing a somewhat obscure first triad. The red rings often divided by a narrow black ring.

Original description (free translation from the French).—Our museum has received five specimens of this species from Mexico, all identical in pattern.

The snout is black; behind the eye, a white band extends onto the postoculars and the anterior part of the parietals, interrupted medially. Except for the fifth and sixth upper labials, the third and fourth lower labials, and the chin shields, which are white, the rest of the head is black as far as the neck. At this point

there is a series of white scales arranged like a necklace of pearls; behind this there is a large black triangular marking, followed by a light band (red), extending for three or four scale-lengths, in which the tips of the scales are black. From this point there are thirteen or fourteen groups of triple black bands [triads], which tend to be confluent beneath, each [individual] band extending over three or four scales and separated from each other by a single series of white scales [really by a double series, cf. plate]. The spaces between the triads are 4 scales long, and there are large black spots in these [red] bands on the ventral surface. The tail is black, with six white rings formed by a single series of scales.



FIG. 34. Type of *Micrurus elegans* Jan (from Icon. Gen. Ophidiens, Livr. 42, pl. 5, fig. 2).

The measurements and scale counts for three specimens are given as follows:

	Milan	Bonn	Turin
Total length	470 mm.	490 mm.	495 mm.
Tail	40 mm.	45 mm.	50 mm.
Ventral plates	213	208	199
Subcaudals	29	31	37

Notes on original description.—The scale counts given for the Milan and Bonn specimens correspond to those of females, for the Turin specimen to those of a male. The Milan specimen, figured by Jan (1858, 1859), is designated as the lectotype. The notation for the measurements in the original is that of inches and lines, but the figures thus given seem to be quite impossible. Centimeters and millimeters must have been intended, for elsewhere in the same paper a snake of 120 centimeters length is noted as measuring 1 m. 20".

Variation.—The range of variation in ventrals in nine males is 189 to 197, and in caudals 37 to 43. In five females the corresponding figures are 206 to 216 and 29 to 31. The black triads on the body (counting the nuchal band as the last ring of an anterior triad) num-

ber $\frac{1}{3}$ —10— $\frac{1}{3}$ to $\frac{1}{3}$ —13— $\frac{1}{3}$ in males, and $\frac{1}{3}$ —12— $\frac{1}{3}$ to $\frac{1}{3}$ —13— $\frac{1}{3}$ in females. The black rings on the tail in both sexes range from 5 to 8. The supranal scales bear strong keels in adult males. There are frequently from one to five undivided caudals, and one male specimen has 22 undivided. Only three out of eleven specimens in which this feature has been noted have all of the subcaudals (except the terminal one) divided. The narrow light band over the head behind the eyes is interrupted in most specimens.

The largest specimen measured, a female, is 555 mm. in length (tail 48 mm.). The largest male measures 525 mm. (tail 76 mm.).

Distribution.—*Micrurus elegans elegans* ranges from Xico in northern Vera Cruz to Mirador in the south. It is to be expected in lowland Tabasco. Unlike *M. elegans verae-pacis*, it appears to be a snake of the lowlands. The ranges of the two forms are not known to meet, and their ventral counts do not overlap. The distributions of these two allopatric forms, separated by the Isthmus of Tehuantepec, contribute evidence that the species was present in Mexico during Tertiary times and during the period when the Guatemalan highland was an island. The Guatemalan form is known from Chiapas (Univ. Calif. L. A. Mus. no. 2025) and from Teapa, Tabasco. It is to be inferred that the Tabasco specimen came from the mountainous hinterland to the south.

Micrurus laticollaris Peters

Elaps marcgravii var. *laticollaris* Peters, 1869, Monatsber. Akad. Wiss. Berlin, 1869: 877—Puebla, Mexico.

Micrurus laticollaris Schmidt, 1933, Field Mus. Nat. Hist., Zool. Ser., 20: 39; 1936, op. cit., p. 215, fig. 27; Taylor, 1940, Univ. Kansas Sci. Bull., 26: 484; Smith and Taylor, 1945, Bull. U. S. Nat. Mus., 187: 175; 1950, Univ. Kansas Sci. Bull., 33: 341.

Material examined.—Puebla (probably Matamoros): Zool. Mus. Berlin 6659 (3 cotypes, one exchanged to Chicago Nat. Hist. Mus., no. 95836). Guerrero: crossing of Acapulco–Mexico City road at Balsas River, Univ. Ill. Mus. Zool. no. 19197. Michoacan: El Sabino near Uruapan, Mus. Nat. Hist. Univ. Kansas nos. 5083–5084; La Playa, Jorullo, Brit. Mus. (Nat. Hist.) no. 1940–1–11–38. Morelos: 12 miles south of Cuatla, Univ. Ill. Mus. Zool. no. 25928; Baranca, near Cuernavaca, U. S. Nat. Mus. no. 20167.

Diagnosis.—A small coral snake of usual cylindrical form and normal *Micrurus* scale pattern, with black rings arranged in triads, the middle broader in each group, one separated from the outer ones

by broad yellow rings, the first triad incomplete, ventrals in males about 210, in females 218, caudals respectively 43 and 39; temporals uniformly 1-2.

Original description (free translation from the German).—Head black, including the anterior part of the parietals, so that the posterior angle of the frontal is light. A yellow ring on the posterior part of the head, extending to the second dorsal scale row; this is followed by a broad black ring that extends over 12 to 13 scale rows; followed by a yellow ring 3 to 4 scales wide, and this in turn by a black ring 4 to 5 scales wide. This is then followed by a red ring 6 to 9 scales in width, in which the tips of the scales are black. Behind this are black rings arranged in threes, the outer separated from the middle one by yellow rings, the middle ring being about twice as wide as the outer ones. Each group of three rings is separated from the next by a broad red black-spotted ring. Including that of the head, there are 7 or 8 such triads on the body. The tail has three broad black rings separated by narrower yellow ones.

Notes on cotypes.—I have examined the three cotypes in the Zoological Museum of Berlin, one of which is a male, which is hereby designated as the lectotype (Berlin no. 6659 ♂). The scale counts of the type are: dorsals 15; ventrals 211 (counted from the chin-shields); caudals 43, all divided; upper labials 7, lower labials 7; oculars 1-2 and temporals 1-2 on each side; and triads $\frac{2}{3}$ -5- $\frac{2}{3}$ on the body. This is the only male specimen of the species thus far in collections. The ventrals in the two female specimens number 215 and 217, the caudals 38 and 36, and the black triads in the pattern (on the body) are $\frac{2}{3}$ -7, and $\frac{2}{3}$ -6- $\frac{2}{3}$.

Variation.—The ventrals in eight female specimens range from 210 to 225 (average 218) and the caudals from 35 to 43 (average 39). The number of triads on the body ranges from $\frac{2}{3}$ -5- $\frac{2}{3}$ to $\frac{2}{3}$ -7- $\frac{2}{3}$, with two or three wide black rings on the tail, not evidently a part of the triad arrangement. The black anterior band on the head is clearly the first black band of the first triad. The scales of the yellow bands are not black spotted, whereas all of the red scales bear a small terminal spot; this makes the yellow bands very distinct, even in faded specimens.

The longest specimen, a female, measures 728 mm. (tail 82 mm.).

Distribution.—The range of *Micrurus laticollaris* is limited to the upper part of the Balsas Basin, in southwestern Mexico.

Discussion.—It is noteworthy that only two of the numerous coral snakes of Mexico have the triad pattern that is so widely prevalent among the South American species. The fact that these two, *elegans* and *laticollaris*, are so extremely distinct indicates that they have been present in the southward extension of North America through-

out the Tertiary. These species contribute to my analysis of the "paleo-peninsular" nature of this fauna (Schmidt, 1943; see also Dunn, 1931).

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